IN THE CLAIMS

1 – 26. (Cancelled)

27. (Currently amended) An implantable medical apparatus for detecting diastolic heart failure (DHF) comprising:

a sensor configured to interact with a heart to obtain information associated with functioning of the heart; and

a DHF determining device supplied with said information that detects a DHF state of the heart from said information by extracting from said information a time duration ~~of only a~~ between predetermined diastolic events in a diastolic phase ~~of diastole~~ of the heart representing only a portion of said diastolic phase, and determining that said DHF state exists, and emitting an output signal indicating said DHF state when said time duration exceeds an upper limit value or is below a lower limit value.

28. (Previously presented) An apparatus as claimed in claim 27 wherein said DHF determining device comprises a comparator that compares said time duration with said upper limit value and said lower limit value to obtain a comparison result, said comparison result being indicative of said DHF state.

29. (Previously presented) An apparatus as claimed in claim 27 wherein said DHF determining device comprises a calculating unit that calculates, from said information from said sensor, said time duration, as a time from an occurrence of peak blood flow velocity through the mitral valve of the heart to a time of occurrence of zero blood flow velocity through the mitral valve of the heart.

30. (Previously presented) An apparatus as claimed in claim 29 wherein said calculating unit determines said time duration by extrapolating said mitral blood flow velocity to zero, if an actual occurrence of zero blood flow velocity through the mitral valve does not occur before an atrial contraction of the heart.

31. (Previously presented) An apparatus as claimed in claim 30 wherein said calculating unit extrapolates the mitral blood flow velocity to zero by determining a time derivative of blood flow velocity through the mitral valve shortly after said occurrence of said peak blood flow velocity through the mitral valve.

32. (Previously presented) An apparatus as claimed in claim 29 wherein said sensor senses an IEGM signal from the heart, and wherein said calculating unit calculates the time of occurrence of said peak blood flow velocity through the mitral valve to the time of occurrence of zero blood flow velocity through the mitral valve from said IEGM.

33. (Previously presented) An apparatus as claimed in claim 29 wherein said sensor is an impedance sensor that senses an impedance of the heart, and wherein said calculating unit calculates the time from the occurrence of said peak blood flow velocity through the mitral valve to zero blood flow velocity through the mitral valve from said impedance.

34. (Previously presented) An apparatus as claimed in claim 29 wherein said sensor is a sound sensor that detects a sound signal associated with said functioning of the heart, and wherein said calculating unit calculates the time from the occurrence of said peak blood flow velocity through the mitral valve to zero blood flow velocity through the mitral valve from said sound signal.

35. (Previously presented) An apparatus as claimed in claim 29 wherein said sensor is an accelerometer that detects an activity signal representing activity of a subject in whom said DHF determining device is implanted, and wherein said calculating unit calculates the time from the occurrence of said peak blood flow velocity through the mitral valve to zero blood flow velocity through the mitral valve from said activity signal.

36. (Previously presented) An apparatus as claimed in claim 27 wherein said DHF determining device comprises a calculating unit that calculates, as said time duration, an isovolumic relaxation time (IVRT) from said information from said sensor.

37. (Previously presented) An apparatus as claimed in claim 36 wherein said sensor detects an IEGM from the heart, and wherein said calculating unit determines said IVRT from said IEGM.

38. (Previously presented) An apparatus as claimed in claim 36 wherein said sensor is an impedance sensor that measures an impedance of the heart, and wherein said calculating unit calculates said IVRT from said impedance.

39. (Previously presented) An apparatus as claimed in claim 36 wherein said sensor is a sound sensor that detects a sound signal associated with said functioning of the heart, and wherein said calculating unit calculates said IVRT from said sound signal.

40. (Previously presented) An apparatus as claimed in claim 36 wherein said sensor is an accelerometer that detects an activity signal of a patient in whom said DHF determining device is implanted, and wherein said calculating unit calculates said IVRT from said activity signal.

41. (Previously presented) An apparatus as claimed in claim 29 wherein said DHF determining device determines said time duration respectively at predetermined time intervals, thereby obtaining a plurality of time durations, and comprises a memory in which said plurality of time durations are stored.

42. (Previously presented) An apparatus as claimed in claim 29 wherein said DHF determining device determines said time duration respectively at a plurality of predetermined time intervals, and comprises a comparator that compares each of said time durations to an upper limit value to identify a first plurality of time durations above said upper limit value and respective first magnitudes of respective deviations of said first plurality of time durations from said upper limit value, and a second plurality of time durations below said lower limit value and second magnitudes of deviations of said second plurality of time durations from said lower limit value, and comprises a memory in which said first plurality of time durations, said first magnitudes, said second plurality of time durations, and said second magnitudes are stored.

43. (Previously presented) An apparatus as claimed in claim 29 wherein said DHF determining device determines said time duration at a plurality of different times, and determines changes in the respective time durations determined at said different times, and comprises a memory in which said changes are stored.

44. (Previously presented) An apparatus as claimed in claim 29 comprising an alerting unit that emits a humanly perceptible alert if a deviation of said time duration from either of said upper limit value or said lower limit value exceeds a predetermined threshold value.

45. (Previously presented) An apparatus as claimed in claim 44 wherein said alerting unit triggers said alert if a length of time that said deviation exceeds said predetermined threshold value exceeds a predetermined length of time.

46. (Previously presented) An apparatus as claimed in claim 29 wherein said DHF determining device determines said time duration at respectively different times and detects a change in said time duration detected at respectively different times, and comprises a comparator that compares said change to a predetermined threshold value, and an alerting unit that emits a humanly perceptible alert if said change exceeds said predetermined threshold value.

47. (Currently amended) An implantable cardiac pacemaker comprising:

a pulse generator that emits stimulation pulses;

an electrode system configured to interact with the heart of a subject to deliver said stimulation pulses to the heart in a pacing therapy regimen;

a sensor configured to interact with a heart to obtain information associated with functioning of the heart;

a DHF determining device supplied with said information that detects a DHF state of the heart from said information by extracting from said information a time duration ~~of only a~~ between predetermined diastolic events in a diastolic phase ~~of diastole~~ of the heart representing only a portion of the diastolic phase, and determining that said DHF state exists, and emitting an output signal indicating said DHF state when said time duration exceeds an upper limit value or is below a lower limit value[[.]]; and

a control unit connected to said DHF determining device and to said pulse generator, said control device being supplied with said detector output and controlling said pulse generator to modify said pacing therapy regimen dependent on said DHF parameter.

48. (Previously presented) A method for detecting diastolic heart failure (DHF) comprising:

with a sensor configured to interact with a heart, obtaining information associated with functioning of the heart; ~~and~~

in a computerized processor, automatically electronically detecting a DHF state of the heart from said information by extracting, from said

information, a time duration ~~of only a~~ between predetermined diastolic events in a diastolic phase ~~of diastole~~ of the heart representing only a portion of the diastolic phase, and determining that said DHF state exists and emitting an output signal indicating said DHF state when said time duration exceeds an upper limit value or is below a lower limit value; and

when said DHF state is determined to exist, emitting an output signal from said processor indicating that said diastolic state exists.

49. (Previously presented) A method as claimed in claim 48 comprising determining said DHF state by comparing said time duration with said upper limit value and said lower limit value to obtain a comparison result, said comparison result being indicative of said DHF state.

50. (Previously presented) A method as claimed in claim 48 comprising calculating, from said information from said sensor, said time duration, as a time from an occurrence of peak blood flow velocity through the mitral valve of the heart to a time of occurrence of zero blood flow velocity through the mitral valve of the heart.

51. (Previously presented) A method as claimed in claim 50 comprising calculating said time duration by extrapolating said mitral blood flow velocity to zero, if an actual occurrence of zero blood flow velocity through the mitral valve does not occur before an atrial contraction of the heart.

52. (Previously presented) A method as claimed in claim 50 comprising calculating said time duration by extrapolating the blood flow velocity to zero by

determining a time derivative of blood flow velocity through the mitral valve shortly after said occurrence of said peak blood flow velocity through the mitral valve.

53. (Previously presented) A method as claimed in claim 50 comprising, with said sensor, sensing an IEGM signal from the heart, and calculating the time of occurrence of said peak blood flow velocity through the mitral valve to the time of occurrence of zero blood flow velocity through the mitral valve from said IEGM.

54. (Previously presented) A method as claimed in claim 50 comprising, with said sensor, sensing an impedance of the heart, and calculating the time from the occurrence of said peak blood flow velocity through the mitral valve to zero blood flow velocity through the mitral valve from said impedance.

55. (Previously presented) A method as claimed in claim 50 comprising, with said sensor, detecting a sound signal associated with said functioning of the heart, and calculating the time from the occurrence of said peak blood flow velocity through the mitral valve to zero blood flow velocity through the mitral valve from said sound signal.

56. (Previously presented) A method as claimed in claim 50 comprising, with said sensor, detecting an activity signal representing activity of a subject in whom said sensor is implanted, and calculating the time from the occurrence of said peak blood flow velocity through the mitral valve to zero blood flow velocity through the mitral valve from said activity signal.

57. (Previously presented) A method as claimed in claim 50 comprising calculating, as said time duration, an isovolumic relaxation time (IVRT) from said information from said sensor.

58. (Previously presented) A method as claimed in claim 57 comprising, with said sensor, detecting an IEGM from the heart, and calculating said IVRT from said IEGM.

59. (Previously presented) A method as claimed in claim 57 comprising, with said sensor, measuring an impedance of the heart, and wherein said calculating unit calculates said IVRT from said impedance.

60. (Previously presented) A method as claimed in claim 57 comprising, with said sensor, detecting a sound signal associated with said functioning of the heart, and calculating said IVRT from said sound signal.

61. (Previously presented) A method as claimed in claim 57 comprising, with said sensor, detecting an activity signal of a patient in whom said sensor is implanted, and calculating said IVRT from said activity signal.

62. (Previously presented) A method as claimed in claim 48 comprising determining said time duration respectively at predetermined time intervals, thereby obtaining a plurality of time durations, and electronically storing said plurality of time durations in a memory.

63. (Previously presented) An implantable cardiac pacemaker as claimed in claim 47 wherein said DHF determining device determines said time duration at a plurality of different times, and determines changes in the respective time durations determined at said different times, and wherein said implantable cardiac pacemaker comprises a memory in which said changes are stored.